What is Claimed is:

1. A mass spectrometer system including a mass analyzer disposed in a high vacuum chamber for analyzing ions formed at atmospheric pressure and directed to the analyzer through intermediate vacuum chambers including:

first and second evacuated chambers directly preceding the mass analyzer chamber with the first chamber being at a higher pressure than the second chamber,

a first multipole ion guide in the first chamber for guiding ions into said second chamber,

a second multipole ion guide in the second chamber for guiding ions from the first chamber into the high vacuum chamber for mass analysis, and

means associated with one or both of said first and second multipole ion guides for increasing the translational kinetic energy of the adduct ions so that at the vacuum pressure of the second interface chamber adduct ions traveling into the chamber are converted into protonated molecular cations or molecular anions ions without fragmentation of these ions whereby to increase the sample ion current and therefore the sensitivity of the mass spectrometer system.

Sub A1

2. A mass analyzer as in claim 1 including ion lenses preceding each said multipole ion guide and a DC voltage is applied between a selected lens and its associated ion guide to increase the translational kinetic energy of the adduct ions entering the second interface chamber.

3. A method of mass analyzing ions produced at atmospheric pressure, in which adduct ions are formed, and introduced into a mass analyzer disposed in a vacuum chamber,

the step of dissociating the adduct ions prior to entry into the mass analyzer to increase the analyte ion current into the mass analyzer.

Sub A2

4. The method of operating a mass spectrometer system including a mass analyzer which analyzes ions formed at atmospheric pressure, said system including

first and second multipole ion guides disposed in serial first and second evacuated chambers separated by an ion lens for guiding analyte ions into said mass analyzer and an ion lens defining the first evacuated chamber which comprises

applying a DC offset voltage between a selected one or both ion lenses and the succeeding multipole ion guide having an amplitude so as to provide translational kinetic energy to said adduct ions to dissociate the adduct ions at the pressure of the second chamber to increase the sample ion current and the sensitivity of the mass spectrometer system.

5. A mass spectrometer system as in claim 4 in which the pressure in the first chamber is below 500 mTorr, and in the second chamber is below 1 mTorr, and the offset voltage applied between the interchamber lens and the second multipole ion guide is between ±10 volts and ±30 volts.

6. A mass spectrometer system as in claim 5 in which the pressure in the first chamber is less than 250 mTorr, and in the second chamber is less than 0.7 mTorr.

7. A mass spectrometer system as in claim 5 in which the pressure in the first chamber is less than 175 mTorr, and in the second chamber is less than 0.5 mTorr.

8. A mass spectrometer as in claim 6 or 7 in which the offset voltage is ±10 volts.

9. The method of analyzing ions and adduct ions produced at or near atmospheric pressure in a mass analyzer,

guiding said ions and adduct ions through at least a first chamber maintained at a first pressure and a second chamber maintained at a lower pressure,

adding translational kinetic energy to said adduct ions as they travel through said chambers such that in the second chamber the adduct ions are dissociated prior to entering the mass analyzer.

Sub A3